

# PATENT ABSTRACTS OF JAPAN

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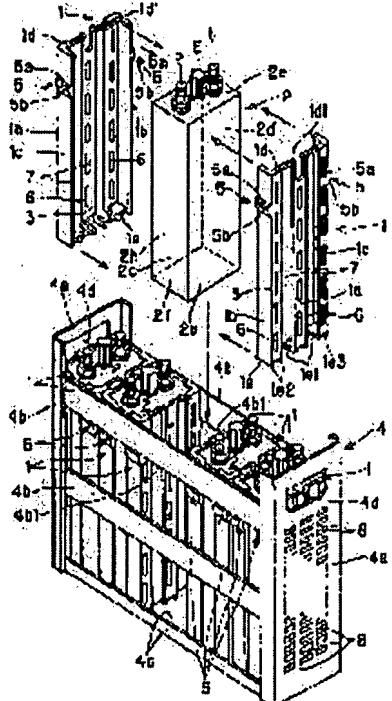
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## (54) SPACER BETWEEN BATTERIES AND UNIT BATTERY

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide spacers between batteries facilitating housing-fixing work of the batteries into a housing frame, and preventing jumping of the housed and fixed batteries by vertical vibration as the spacers between batteries fixing a battery unit by placing the spacers between the adjoining batteries of the battery unit composed of the plural batteries housed in the battery unit housing frame and between the batteries at front and back ends and the front and back frame plates of the housing frame.

**SOLUTION:** Four-periphery fitting walls 1b, 1c, 1d, 1e extending to side 1 from four-periphery edges of a square plate-like spacer main plate 1a are provided, and on the side surrounding frame spacer having a fitting recessed face 3 for fitting to the front portion or the back portion of the battery 2. Locking protrusions 5, 5 locking the right and the left side frame member 4b, 4b of a battery unit housing frame 4 are provided on the outer faces of the right and the left side walls 1b, 1c of the four-periphery fitting walls.



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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a unit cell at the spacer list between cells.

[0002]

[Description of the Prior Art] As for the conventional spacer between cells, it is well-known to be used in order to consist of synthetic-resin plate manufacturing, such as vinyl chloride, to use since it fixes to the list between the cells and cells which were held within the cell unit receipt limit between a cell and this frame order end plate, and to produce the unit cell by which pushing immobilization was carried out. Namely, while putting in order and holding the predetermined number individual of the cell which consists of the metal vessel which built in the cell element within the metal limit for unit cell receipt in a cross direction at a single tier and fixing each of the cell within this receipt limit at immobilization In order to carry out electric insulation of between the cell of the both ends, and the both-ends frame boards of this frame for receipt to each [ the / which was held ] list between adjacency \*\*\*\*\* The above-mentioned tabular spacer between cells was stuffed into each [ the ] list between adjacency \*\*\*\*\* between the cell of the both ends, and the frame board before and behind this receipt frame, namely, the unit cell was strongly pressed to the frame board before and behind the receipt frame, it fixed, and the unit cell was constituted.

[0003]

[Problem(s) to be Solved by the Invention] However, since \*\* et al. and the conventional spacer between cells were tabular, in order to have fixed the unit cell in the direction of a laminating of each cell held within the limit, it was not able to push in a spacer among these cells, and it was indispensable, and a cell was not able to fly up from a receipt frame by vertical vibration while in use, and applying pressure of a cross direction within the limit not only requires the pushing activity of the hard spacer, but it was not able to prevent the danger of jumping out. Furthermore, in order to stick with a spacer, exoergic stripping worsened, the cell's having brought about the temperature up of a cell, and having un-arranged further again -- a receipt frame tends to produce deformation -- when a cell expanded.

[0004]

[Means for Solving the Problem] This invention is what offers the spacer between cells which brings about the unit cell which was excellent in versatility, like the above-mentioned technical problem of the above-mentioned conventional spacer between cells is canceled, and hold immobilization of the cell of a unit cell receipt within the limit can be made easy. While forming in the surrounding frame mold spacer which has the concave surface for fitting which fits into the anterior part or the posterior part of a cell which consists of the metal vessel which prepared four peripheral walls for fitting prolonged in 1 side from four peripheries of a rectangular spacer primary plate, and built the cell element in the 1 side It is characterized by arranging the inferior surface of tongue of the transversal frame member of right and left of the metal frame for unit cell receipt, and the projection for a stop to stop in each external surface of the side attachment wall of right and left of these the four peripheral walls for fitting.

[0005] In this case, it is desirable to prepare many through tubes in the spacer primary plate of the \*\* type spacer between cells of above-mentioned this invention.

[0006] Moreover, as for this projection of right and left of the spacer between cells of this invention, it is desirable to form the external surface in the downward inclined plane which is pressing hard as a lower limit is reached.

[0007] Furthermore, while this invention does not have a location gap in a longitudinal direction while being able to prevent the jump to the upper part of the cell by vibration of the vertical direction using the spacer between cells of above-mentioned this invention, and being able to carry out hold immobilization within the unit cell receipt limit the electric insulation between the cell of between contained adjacency \*\*\*\*\* and an order edge, and the frame board before and behind this receipt frame -- further It is what can also secure electric insulation with the both sides of a cell and an inferior surface of tongue, the left and right laterals of a receipt frame, and a base, and offers a unit cell further.

Before a cell what carried out fitting wearing of the two sheets of the spacer between cells of the surrounding frame mold of above-mentioned this invention at a posterior part It is characterized by making the transversal frame member of right and left of this unit cell receipt frame stop the projection arranged in the external surface of the right-and-left side attachment wall of the spacer between cells of a pair before and after number[ of appointed numbers ]-holding within the unit cell receipt limit and carrying out fitting wearing of each of that cell.

[0008]

[Embodiment of the Invention] Next, one example of the gestalt of operation of this invention is explained based on an accompanying drawing. 1 shows the spacer between cells of this invention with a drawing. This spacer 1 between cells consists of the three-dimensional Plastic solid of synthetic-resin material, such as vinyl chloride. It extends in 1 side from spacer primary plate 1a and four peripheries of the rectangle of the same configuration and magnitude. front 2a of the cell 2 of the Nogata form or rear-face 2b, and abbreviation -- a cell 2 4 peripheral surfaces Namely, left-hand side wall 1b which fits in exactly so that it may engage with left lateral 2c, 2d of right laterals, top-face 2e, and 2f of inferior surfaces of tongue, Four peripheral walls for fitting which consist of right-hand side wall 1c, 1d of top-face walls, and inferior-surface-of-tongue wall 1e are prepared. While constituting in the surrounding frame mold spacer formed in the concave surface 3 for fitting which uses as the front face of this cell 2 the interior surrounded by the primary plate and four peripheral walls, and fits into a part of a part of peripheral surface, i.e., anterior part, or the rear faces and four peripheral surfaces, i.e., a posterior part Between frame board 4a before and behind the unit cell receipt frame 4 and 4a was connected with each external surface of this left-hand side wall 1b of the four peripheral walls for fitting, and this right-hand side wall 1c, and the projections 5 and 5 for a stop which engage with the lower limit side of the tabular transversal frame members 4b and 4b of the right and left located at predetermined height were arranged and constituted.

[0009] This [ cell 2 / itself ] is well-known, and it consists of the metal container having a cell element. This metal container consists of the tabular metal lid given and welded to the peristome of a metal battery case and this battery case at the same flat surface, and although the cell element to build in is not illustrated, it consists of a group of electrode and the electrolytic solution. The liquid stopper E is further provided in the middle of these terminals P and N with the positive-electrode column terminal P which has the spiral rib peripheral surface which penetrates a metal lid and projects up in top-face 2e of the metal container, and the same negative-electrode column terminal N.

[0010] In the example of illustration, the side attachment walls 1b and 1c of right and left of the spacer 1 between cells of the surrounding frame mold of this invention were used as the engagement wall prolonged in the extent side engaged to about 1/3 abbreviation for the thickness of a right-and-left both-sides sides [ of the cell 2 / 2c and 2d ] cross direction, when fitting wearing of this spacer 1 between cells was carried out at the anterior part or the posterior part of a cell 2. Moreover, although 1d of the top-face wall is used as the wall for engagement of the U-shaped frame which formed 1 1d of cavities which serve as an open large field without covering top-face 2c of a cell 2 as much as possible and the inferior-surface-of-tongue wall 1e for engagement has the same depth as these right-and-left side attachment walls 1b and 1c It formed in the engagement wall in which the rectangular notch one e1 which serves as an open field so that 2f of inferior surfaces of tongue of a cell 2 may not be covered as much as possible was formed.

[0011] Furthermore, the projections 5 and 5 for a stop which protruded on the external surface of the side-attachment-wall sides 1b and 1c of right and left of this spacer 1 between cells of the surrounding frame mold of this invention At the same time the inside of the transversal frame members 4a and 4a of these right and left of this unit cell receipt frame 4 \*\*\*\*ed, and it was \*\* inserted in it in the process held in this unit cell receipt frame 4 and it reached base 4c of this unit cell receipt frame 4 The level upper limit sides 5a and 5a of the projections 5 and 5 are established in the lower limit side four a1 of the corresponding transversal frame members 4a and 4b on either side, and a height location and thickness which are stopped by four b1 by projecting. the thickness of the projections 5 and 5 for a stop of the right and left -- the thickness of the tabular transversal frame members 4a and 4b of these right and left of this unit cell receipt frame 4, and abbreviation -- it can constitute in the same thickness or what is slightly thicker than it: When the thickness of the transversal frame members 4a and 4b on either side is about 1.6mm, thickness of each projections 5 and 5 is set to about 1.6-2.0mm.

[0012] Moreover, in order to do smooth the projection 5 for a stop of the above-mentioned right and left, and the above-mentioned slide contact insertion activity over these transversal frames 4a and 4b of right and left of five, it is desirable to form the outside configuration of the projections 5 and 5 in the downward inclined planes 5b and 5b which are pressing hard gradually as a lower limit is reached.

[0013] Moreover, in the spacer 1 between cells of the surrounding frame mold of this invention of illustration, two articles of band-like air holes 7 from which form a majority of many through tubes 6 for aeration, and are further prolonged in the vertical direction which opens the internal concave surface space 3 and the internal open air for free passage crosswise [ the ], and it escapes to the notching hole one e1 of a lower limit were arranged in spacer primary

plate 2a which meets front 2a of the cell 2, or rear-face 2b.

[0014] On the other hand, this unit cell receipt frame 4 consists the cells 2 and 2 of a predetermined number, and -- of the metal case of the Nogata form of straight side suitable for carrying out fitting wearing of the spacers 1 and 1 between cells of this invention at the order section, and holding in each of that cell 2 in the example of illustration. Furthermore, the frame boards 4a and 4a before and after countering a detail in the die-length direction The edge section on either side is bent to the inner direction, respectively, and it considers as a U shape. The height Many through tubes 8 and 8 for cooling and -- were arranged in the lower area where it has the height prolonged up, and it handles in the up area, 4d of holes of business is drilled in it, and the held cell meets rather than the top face of the cell 2 held in the frame 4. The bottom plate 4c considered as the back up plate perpendicularly bent up by the right-and-left side edge, and was connected with the lower limit of the spacer primary plates 1a and 1a of order by welding at the both ends. In each of that. \*\*\*, the transversal frame members 4b and 4b which consist of a narrow width band-like plate on either side consist spacing in the vertical direction, and arrange 4b and two articles 4b in predetermined height, and the both ends are welded to them by the spacer primary plates 1a and 1a of order.

[0015] In this way, the spacer 1 between cells of this invention can be used as follows, and can carry out hold immobilization of the cell as follows into the unit cell receipt frame 4. Before holding a cell 2 in this unit cell receipt frame 4, like designation in this cell 2 order section first at drawing 1 namely, like \*\*\*\* from the cross direction of this cell 2 Fitting wearing of the spacers 1 and 1 between cells of this invention is carried out on the concave surfaces 3 and 3 for fitting, and it inserts into this receipt frame 4 like \*\*\*\* in the state of this fitting, and holds in the condition of having stopped the upper limit sides 5a and 5a of the projections 5 and 5 of those right and left with the inferior surface of tongue four b1 of the transversal frame members 4b and 4a of the upper part of right and left of this receipt frame 4, and four b1. In this way, since the spacers 1 and 1 between cells of a pair before and after writing are in the condition were fixed to this receipt frame 4 to vibration of the vertical direction, each cell 2 which is in a fitting condition between them is not only fixed to vibration of front and rear, right and left within the spacer 1 between the fixed cell, and 14, but is fixed to vibration of the vertical direction, and flying up from the receipt frame 4 is prevented. However, if the spacers 1 and 1 between cells of \*\* et al. and a this order pair are pushed on a cross direction by the strong force along the die-length direction of transversal frame 4a of transversal frames 4b and 4b, it is possible for the projections 5 and 5 on either side to slide along with the lower limit side four b1 and four b1, and to move and install the cell 2 by which fitting wearing was carried out in the request location in the receipt frame 4. the time of forming the downward inclined planes 5b and 5b in the spacer 1 between cells of an order pair, and the projections 5 and 5 of right and left of one in hold of this cell -- those inclined planes 5b and 5b -- the inside of those transversal frames 4a and 4b that meet --\*\*\*\*ing -- \*\* et al. -- smooth insertion can be performed. The activity which carries out fitting wearing and holds a predetermined number of cells 2 for the spacers 1 and 1 between cells in the receipt frame 4 as mentioned above in this way at the order section is repeated. In the example of illustration, five cells 2 and 2 and the unit cell A shown in drawing 2 by which hold immobilization of -- was carried out - drawing 4 are obtained in this unit cell frame 4. It is placed between duplexs between each of that cell 2 by the spacers 1 and 1 between cells of this invention by which fitting wearing was carried out before and behind each of that cell 2. Between the cells 2 and 2 of the both ends of the cross direction, and the frame boards 4b and 4b of order, the spacers 1 and 1 between cells of this invention intervene, respectively. In the frame boards 4a and 4a before and behind this unit cell receipt frame 4, from the first, with the fitting walls 1b, 1c, and 1e, while the transversal frame members 4b and 4b of the right and left and electric insulation with the base 4c are secured, each of that cell 2 Each spacer 1 between cells by which fitting was carried out from order each of that cell 2 Since stop immobilization is carried out through the projections 5 and 5 of the right and left at the transversal frame members 4b and 4b of right and left of the unit cell receipt frame 4 as described above Each cell 2 by which fitting maintenance was carried out with the spacers 1 and 1 between cells before and behind the each Since it will be in the condition of it having been fixed to the location by the spacers 1 and 1 between these fixed cells, and having held It is not necessary to push in a spacer [ strong against the frame board before and behind this receipt frame ] tabular to between cells, and to carry out pressure immobilization of the whole cell held in the conventional receipt frame. Immobilization of a cell not only becomes easy, but the immobilization to vibration of the vertical direction is also obtained and it can prevent deformation of the receipt frame by the swelling pressure force of a cell further.

[0016] In addition, in the example of illustration, the spacers 1a and 1a of the spacers 1 and 1 between cells of a pair before and after carrying out fitting wearing of each cell 2 from the order section are held in the condition that it was mutually close by confrontation. And although between the spacer primary plates 1a and 1a of the spacers 1 and 1 between cells of the order edge and the frame boards 4a and 4a before and behind this receipt frame 4 was held in the condition of having been close Since each cell 2 which constitutes a unit cell is fixed to the order section with the spacers 1 and 1 between cells which carried out fitting wearing It is not necessary to make it not necessarily close, few

suitable clearances are consisted in the very close spacer 1 between cells, and the list between one suitably among these between the spacers 1 and 1 between each cell of both ends, front frame board 4a, and back frame board 4a, and hold immobilization can be carried out. Furthermore, the hold fixed activity of a cell becomes easy. Since each cell 2 by which the cell 2 held also in this case constitutes a unit cell can absorb that expansion in that gap even if it does not fly up from the receipt frame 4 and has cell expansion, deformation of the unit cell receipt frame 4 can prevent it good.

[0017] After drawing 2 carries out hold immobilization of the cell for the inside of a frame 4 through the spacer between cells of this invention like \*\*1\*\* as mentioned above, The plan of the unit cell A which connected between forward [ which each of that adjacency \*\*\*\*\* 2 and 2 counters ], and the negative-electrode terminals P and N with the connection lever 10, was connected [ screwed in, fastened and carried out the nut 11, and fixed from on the ] to the serial, and was completed, and drawing 3 show the side elevation, and drawing 4 shows the IV-IV line decision side Fig. of drawing 2 . The heat which it \*\* and is generated on each cell during the use The holes 6 and 6 of a large number prepared in the primary plates 1a and 1a before and behind each spacer 1 between \*\*\*\*\*, --, While it can diffuse outside from the band-like cooling through tubes 7 and 7, the holes 8 and 8 of a large number prepared in the 1 and inferior-surface-of-tongue wall 1e1 list at the frame boards 4a and 4a before and behind the receipt frame 4 1d of notches prepared in 1d of top-face walls, and --, a cooling wind can be sent to each cell 2 from the exterior, and the bad influence of the cell by the temperature up can be prevented. In addition, when it protrudes and the rib one e2 prolonged in a cross direction, one e2, and -- are held in the receipt frame 4, while forming one e3 used as the path for air cooling between the base 4 between the rib one e2 and one e2, it may be made to make still better electric insulation with bottom plate 4c on the inferior surface of tongue of inferior-surface-of-tongue wall 1e of this spacer 1 between cells. \*\*\*\* -- in the example of illustration, the height of the projections 5 and 5 prepared in the side attachment walls 1b and 1c of right and left of the spacer 1 between cells may be prepared in the low location suitable for stopping to the transversal frame members 4b and 4b of the upper part established in right and left of the unit cell receipt frame 4.

[0018]

[Effect of the Invention] Thus, since the spacer between cells which prepared four peripheral walls for engagement prolonged in 1 side in 4 rounds of the primary plate of a spacer, and formed in the one side at the concave surface, and prepared the projection in the external surface of the side attachment wall for engagement of the right and left was constituted when based on this invention the assembly made into the condition of having carried out fitting wearing of the aforementioned spacer in a cell on the concave surface at the cell order section -- a unit cell frame -- the, while carrying out predetermined number group hold By making it make the inferior surface of tongue of the transversal frame of a corresponding unit cell frame stop the top face of a projection of the right and left which protruded on the right-and-left both sides Each cell by which fitting wearing is carried out at the spacer between each cell and this can cancel un-arranging [ for which it is not only stability and immobilization, but it is stability and immobilization and a cell flies up from a frame like before to vibration of the vertical direction to vibration of a cross direction and a longitudinal direction ].

[0019] In this case, when forming the external surface of each projection in the downward inclined plane which is pressing hard as a lower limit is reached, hold of the spacer between that cell can be made smooth.

[0020] Moreover, when preparing many holes in this spacer between cells, and a unit cell frame, respectively, generation of heat in a cell in use can be radiated outside, and the bad influence to the cell by the temperature up can be prevented.

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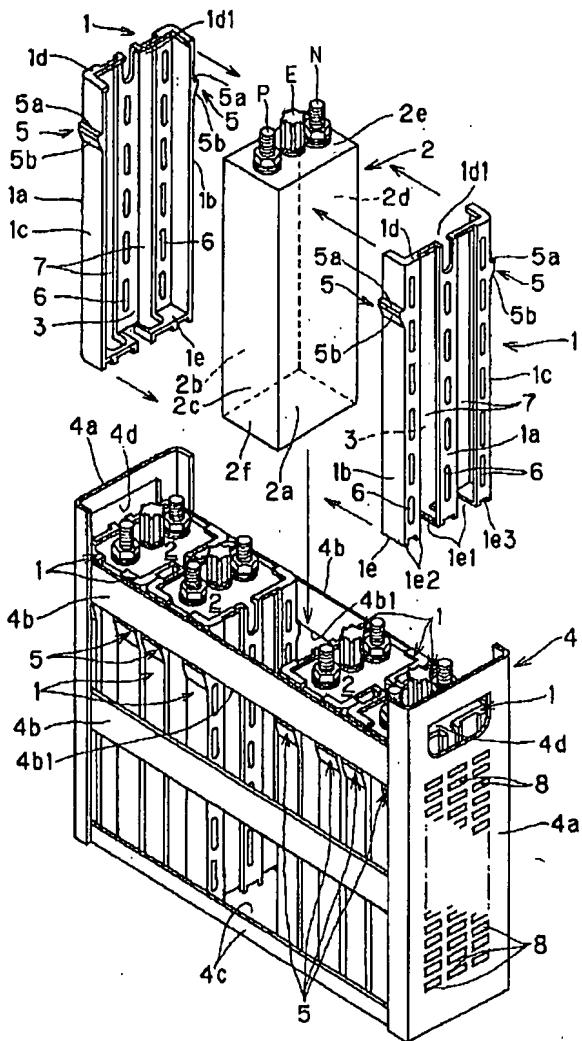
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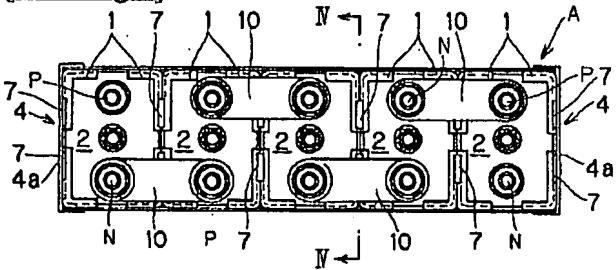
## DRAWINGS

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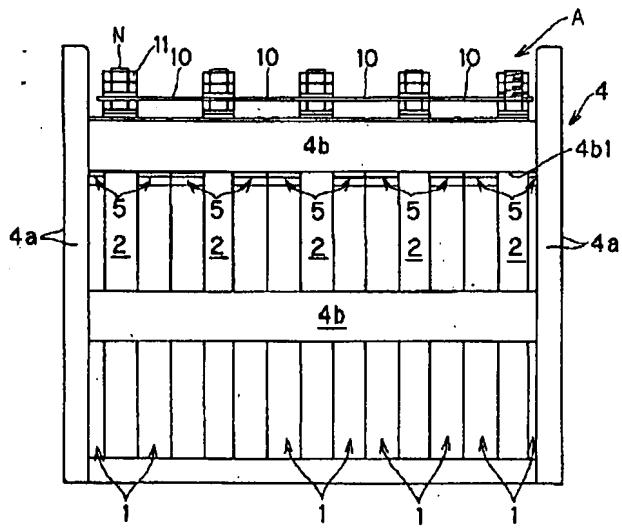
[Drawing 1]



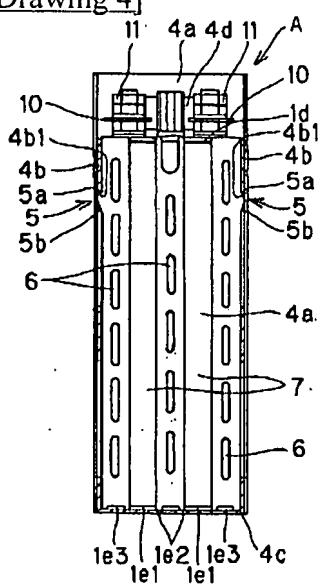
[Drawing 2]



[Drawing 3]



[Drawing 4]




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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The slant-face Fig. explaining the condition of assembling the unit cell of one example of operation of this invention.

[Drawing 2] The plan of the unit cell of this invention.

[Drawing 3] The side elevation of the unit cell of this invention.

[Drawing 4] The IV-IV line decision side Fig. of drawing 2 .

[Description of Notations]

1 \*\* Type Spacer between Cells 1a Spacer Primary Plate

1b Left-hand side wall 1c Right-hand side wall

1d Top-face wall 1e Inferior-surface-of-tongue wall

2 Cell 3 Concave Surface for Fitting

4 Unit Cell Receipt Frame 4a Frame Board of Order

4b Transversal frame member 5 Projection

5a Upper limit side of a projection 5b Inclined plane of a projection

6 Through Tube

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[Translation done.]